SCIENCE

FRIDAY, APRIL 27, 1888.

THE NATIONAL ACADEMY OF SCIENCES, which held its annual meeting in Washington last week, is the most learned of all American scientific societies. Incorporated by the government of the United States, its expenses are paid out of the national treasury, although its members serve without compensation. Made by law the official scientific adviser of the government, it is required, at government expense, to enter upon any scientific investigation which may be asked for by the head of either of the departments, and its conclusions are accepted as those of a competent and disinterested tribunal. For instance: the consolidation of the various Western surveys that were being prosecuted at government expense into the present admirably organized National Geological Survey was the result of a report by a distinguished committee of the National Academy of Sciences, to whom the subject had been officially referred. Another important report was one on the work and discoveries of Dr. Peter Collier, formerly chemist of the Agricultural Department, in relation to sorghum; and more recently a special committee has been engaged, at the request of the secretary of the treasury, in an investigation in regard to the value of the polariscope test in determining grades of sugar. In addition to this official work, the National Academy of Sciences holds two meetings a year, at which business connected with its organization and work is transacted, new members chosen, and papers announcing new discoveries in science, or describing lines of original investigation, are read by members or by other persons presented by members. The meeting this year has been an important one. A larger number of papers than usual were presented; and, although no remarkable discoveries were announced, there was evidence of great activity, in many of them, along all the lines of original scientific investigation. The law limits the number of new members to be elected at each annual meeting to five. Only three were chosen this year, — Profs. G. Brown Goode, Albert Michelson, and S. C. Chandler; but the great scientific attainments of each are an ample guaranty of the purpose of the National Academy to maintain the high standard that has placed it at the head of all our scientific associations, and made membership in it so much coveted by scientific men.

NOTHING IN CONNECTION with the annual meeting of the National Academy of Sciences in Washington last week was likely to impress an attendant at its public sessions more than the ardent enthusiasm of its members in the work in which they are engaged. A few of them are young men, and more of those not members introduced to read papers had not yet reached middle age; but even they were no more absorbed in their labors, or more proud of their successes, than the wearers of snowy locks and gray beards. Even the venerable Dr. C. H. F. Peters, the distinguished astronomer, seemed as much elated at his success in proving that Tycho Brahe, in 1572, with a rude quadrant constructed by himself, determined the position of Nova with an accuracy that would be creditable to a modern astronomer with his wonderfully exact instruments, as was the youngest investigator at being able to add something to the sum of scientific knowledge.

IN THE LAMENTED death of Dr. Cornelius R. Agnew, whose funeral services took place on Saturday last, New York City lost one of its foremost citizens, and science and education a powerful advocate and friend. It was remarked on Saturday last, that so representative an assemblage of men had never before gathered at the bier of any one man in this city, and it was because of the many-sided character of Dr. Agnew's activity. Himself a physician and specialist of the very first rank, he chose the broader field of education for his most powerful efforts. As a trustee of the College of Physicians and Surgeons, as a trustee of Columbia College, and as a founder of the School of Mines, his influence in the cause of higher education can only be appreciated by those who felt it, and by those who worked with him. The friends of Columbia College looked instinctively to him to control and guide that university development which is now beginning its course. From all of these boards and from many others his wise and kindly counsel will be sorely missed, and his place cannot be easily filled, if ever. Dr. Agnew's personal contributions to medical science were principally made in the departments of ophthalmic and aural surgery. He was a prominent member of the Sanitary Commission during the Rebellion, and afterwards one of the founders of the Union League Club.

MEETING OF THE NATIONAL ACADEMY OF SCIENCES.

A Successful Meeting; New Members and Councillors; Medals and Obituary Memoirs; Receptions and Dinners; List of Papers. — Is There Such a Thing as Potential Energy? — Serpent-Mound. — A New Method for the Biological Examination of the Air. — An Interesting Parasite on the Beaver. — The Orbits of Aerolites. — Improvements in Spectrum Photography; Carbon in the Sun. — Vertebrate Fauna of the Puerco Series.

THE meeting of the National Academy of Sciences, held at Washington last week, was in every respect a successful one. About forty members attended; the number of papers offered was greater than usual, nearly all of which were read *in extenso*, leaving very few to be read by title; and the attendance at the public meetings was good. While very little of the business transacted by the academy and by the council is disclosed to the public, it is known that the annual reports were satisfactory, although there was nothing in them of an unusual character. No great scientific discoveries were announced, but several of the papers read showed important progress in special lines of original investigation. Without disparity to others, three may be mentioned as of special importance. They were, 'The Orbits of Aerolites,' by Prof. H. A. Newton; 'Preliminary Notice of the Object, Methods, and Results of a Systematic Study of the Action of Definitely Related Chemical Compounds upon Animals,' by Profs. Wolcott Gibbs and Hobart Amory Hare; and 'Report of Progress in Spectrum Photography,' and 'Note on the Spectrum of Carbon and its Existence in the Sun,' by Prof. H. A. Rowland.

The new members of the academy this year are Prof. G. Brown Goode of Washington, assistant secretary of the Smithsonian Institution, in charge of the National Museum, and a distinguished naturalist; Prof. Albert Michelson, the physicist, of Cleveland, O. He is the gentleman who, when he was in the navy, undertook and carried out at Annapolis novel experiments to determine the velocity of light. He becomes the youngest member of the academy. The third new member is Prof. S. C. Chandler, the distinguished astronomer, of Cambridge, Mass. The six additional members of the council chosen at this meeting were Messrs. Brush, Langley, Meigs, Pickering, Remsen, and Gould.

On Wednesday evening the room at the National Museum in which the meetings of the academy were held was filled by an audience that was gathered to witness the presentation of two gold medals. One, the Lawrence Smith gold medal, was awarded to Prof. H. A. Newton of Yale University, for the study of meteors; and the other, the Henry Draper gold medal, to Prof. E. C. Picker-

ing of Harvard University, for researches in stellar photography. On the same evening obituary memoirs were read, as follows: by Prof. G. F. Barker of the University of Pennsylvania, on the late Prof. Henry Draper of New York; by Prof. Comstock, on Prof. Watson of the University of Michigan; and by Mr. William Sellers of Philadelphia, on Capt. James B. Eads.

The president, Prof. O. C. Marsh, announced the death, since the last meeting, of Dr. F. V. Hayden, an active member of the academy, and Prof. Asa Gray, an associate member.

Largely attended receptions, at which many of the most distinguished people in Washington, both in official, scientific, and literary life, were invited to meet the members of the academy, were given by Prof. Langley and Prof. Alexander Graham Bell, — the former at the Smithsonian Institution, and the latter at Prof. Bell's elegant Washington residence, which was opened for the first time on that occasion since its injury by fire several months ago. A number of dinners were also given during the week in honor of distinguished members of the academy.

The following is a full list of the papers entered: 'The Rotation of the Sun,' by J. E. Oliver; 'The Foundations of Chemistry,' by T. Sterry Hunt; 'On an Improved Form of Quadrant Electrometer, with Remarks upon its Use,' by T. C. Mendenhall; 'On the Vertebrate Fauna of the Puerco Series,' by E. D. Cope; 'Re-enforcement and Inhibition,' by H. P. Bowditch; 'On Apparent Elasticity produced in an Apparatus by the Pressure of the Atmosphere, and the Bearing of the Phenomenon upon the Hypothesis of Potential Energy,' by A. Graham Bell; 'The Orbits of Aerolites,' by H. A. Newton; 'A Large Photographic Telescope,' by E. C. Pickering; 'A New Method for the Biological Examination of Air, with a Description of an Aerobioscope,' by W. T. Sedgwick and G. R. Tucker, presented by J. S. Billings; 'Preliminary Notice of the Object, Methods, and Results of a Systematic Study of the Action of Definitely Related Chemical Compounds upon Animals,' by Wolcott Gibbs and Hobart Amory Hare; 'On the Auditory Bones of the Batrachia,' by E. D. Cope; 'The Orbit of Hyperion,' by Ormond Stone, presented by S. Newcomb; 'Map of Connecticut River Region in Massachusetts,' by B. K. Emerson, presented by J. W. Powell; 'Parallel Series in the Evolution of *Cephalopoda*,' and 'Evolution of *Cephalopoda* in the Fauna of the Lias,' by A. Hyatt; 'The Evidence of the Fossil Plants as to the Age of the Potomac Formation,' by L. F. Ward, presented by J. W. Powell; 'Vision and Energy,' by S. P. Langley; 'Report of Progress in Spectrum Photography,' and 'Note on the Spectrum of Carbon and its Existence in the Sun,' by H. A. Rowland; 'On the Constitution of the so-called Double Halogen Salts,' and 'Studies on the Rate of Decomposition of the Bromides of the Saturated Alcohol Radicals,' by Ira Remsen; 'The Characteristics of the Orders and Suborders of Fishes,' by Theo. Gill; 'The Serpent-Mound and its Surroundings,' by F. W. Putnam; 'The Systematic Relations of *Platypsyllus* as determined by the Larva,' by C. V. Riley, presented by Theo. Gill; 'On the Position of the Nova of 1572, as determined by Tycho Brahe,' by C. H. F. Peters; 'Some Notes on the Laramie Groups,' and 'On the Structure and Relations of Placoderm Fishes,' by J. S. Newberry.

In selecting papers for notice in *Science*, those that admit of statement in popular language have been taken rather than those which in themselves are most important. Some of the latter are so technical in their character as to be intelligible only to specialists. The abstracts of papers are not given in the order in which they were read.

The Hypothesis of Potential Energy.

The full title of Professor Alexander Graham Bell's paper read at the morning session of Thursday was, 'On Apparent Elasticity produced in an Apparatus by the Pressure of the Atmosphere, and the Bearing of the Phenomenon upon the Hypothesis of Potential Energy.' Professor Bell showed to the academy an apparatus that looked like the bellows of an accordion. It consisted of a dozen or more sections, each eight inches long, four inches wide, and two inches deep, connected by an air-tight fabric which surrounded them and covered the outer portions of the end ones. A tube was inserted in the middle one by which the air could be exhausted. Before it was attached to the air-pump, the bellows was not elastic. Bent either to the one side or the other within certain limits, it would remain in the position in which it was placed. But when the air was partially exhausted, if bent to one side or the other, from the position it assumed, it would spring back to its original position with considerable force.

Of course, this elasticity was not due to potential energy, so called, in the bellows, but to the pressure of the atmosphere upon the outside of it, holding the sections of it in close contact. An apparently similar phenomenon in a piece of steel (as in a sword-blade, for instance) is explained by saying that there is potential energy in the steel. Professor Bell's experiment raises the question whether the cause of the elasticity is in the steel itself, or outside of it; whether, in fact, there is any such thing as potential energy in matter, or if its elasticity is not due to its surroundings.

Professor Bell exhibited two very interesting modifications of his apparatus. In the first the sections of the bellows were thinner on one side than on the other; so that, when the air was partially exhausted, it would curl up in the form of a single section of a spiral spring. When in that form, it resisted an effort either to coil it tighter or to straighten it out, although it had none of that apparent elasticity when filled with air under the normal pressure. In the second, a large section was placed in the middle of the bellows, and smaller ones each side of it. When the air was partially exhausted, it was forcibly bent to form an arc of a circle, and a string attached to each end, thus forming of it a bow, from which an arrow was shot.

An interesting discussion ensued after the presentation of Professor Bell's paper. Professor Simon Newcomb thought that Professor Bell's experiments suggested that molecular attraction, commonly called adhesion, may be due to an outward medium, but he did not think it advances them at all on their way to the discovery of this medium. He then defined the terms 'potential energy' and 'conservation of energy,' and explained what scientific men mean when they use them.

Major J. W. Powell objected to the use of the phrase 'potential energy' as unscientific. As ordinarily employed, it is understood to mean something that can do something, while really it is only a name for something that we know nothing about. The thing it applies to is nowhere, it does nothing, we know nothing about it. The term as usually employed is misleading.

Professor Newcomb replied that there is nothing unknown or indefinite about the term 'potential energy,' and repeated his former definition and explanation with several pertinent illustrations. Professor Abbe probably suggested the cause of the divergence of opinion between Professor Newcomb and Major Powell when he said that the confusion arose because physicists give a definite meaning to the term 'potential energy,' which naturalists do not.

Serpent-Mound.

A series of photographic views projected upon a screen made the paper on 'Serpent-Mound and its Surroundings,' by Professor F. W. Putnam of Harvard University, one of the most entertaining to the non-scientific attendants at the meeting of the National Academy. This curious earthwork is in Adams County, O., on a bluff about one hundred feet high, which forms one of the banks of Brush Creek, about eighty miles from its mouth. The land upon which it stands, with that surrounding it, comprising about seventy acres, has been purchased by the Peabody Museum, and set aside as a park. A gravel road has been built from the turnpike to and into the grounds, a spring-house erected, and picnic-grounds laid out. Although Professor Putnam began an examination of the mound during visits to it several years ago, a systematic exploration was not undertaken until last year; and the paper presented to the academy was a report of progress of that exploration.

Briefly described, the mound consists of an oval earthwork about four feet high and twenty feet across, enclosing a space eighty feet long and twenty feet wide. The length of the structure on the outside is one hundred and twenty feet, and its width sixty feet. There is a little mound of stones within the enclosed space. Near one end of this mound begins another of similar construction, but having the form of a serpent. The jaws are extended as though the snake was about to swallow the oval mound; the head

and neck are well defined; the body has three turns, and the tail a double coil. The entire length of the serpent is about 1,420 feet.

Near these principal mounds are several minor ones, and to the south of the serpent a space which bears evidence of having been both the site of an Indian village and also a burial-ground. The whole tract was originally covered with timber and bushes, but it was subsequently cleared and cultivated. Professor Putnam has restored the grass, and has planted about the mound specimens of all the trees that grow in that section of Ohio, thus adding another attraction to the place.

Several years ago Professor Putnam picked up a fragment of human bone that had been turned out by the plough, and at the point where he found it he began to dig last summer. Very near the surface he discovered a human skeleton, a few portions of which only were missing. There was no doubt that this skeleton was modern, — that the burial had been made by the historic Indians, perhaps within the present century. A number of large stones which were originally set up upon their edges about the grave — one at the head, one at the foot, and several along the sides — had been thrown down by the plough, but had not been much removed from their original positions.

This grave was on the edge of what seemed to be a mass of stones about eleven feet long and six feet wide; and a trench dug around the edge of this disclosed several other graves, some of them deeper than the first one discovered, and covered with stones.

Want of space forbids a detailed description of the explorations of last summer. It is sufficient to say that Professor Putnam is convinced that most of the graves are those of interlopers; that is, not of the Indians who built the mound, but of a later race, who probably were ignorant of their predecessors, and did not know that they were living on an old burial-ground. But the skeletons of two of the supposed mound-builders were found. A section made through the centre of one of the mounds disclosed the bones of several 'intruders,' one of which had been disturbed by a woodchuck; but at a depth of six feet was found the skeleton of the man over whom the mound was raised as a monument. The bones were those of a large man, about six feet in height, and showed him to be a person of massive frame. The body lay upon its back, with the right arm extended at right angles, and the left arm at the side. The only object found near it was a mussel-shell that lay near the bones of the left leg.

Beneath the skeleton was a layer of clay that had been placed there, and upon which a fire had been kept for a long time. Near the surface the clay had been burned almost as red as a brick, and it showed evidence of heat to a depth of several inches. On the top of the clay were the ashes from the fire, and perhaps others, several inches thick; and upon these the body had been laid, and the mound erected over it.

In another instance, in the burial-place where the first skeleton was found, the body had been laid upon flat stones covered with a layer of ashes, not from a fire built upon the spot, but elsewhere, and which Professor Putnam suspects were produced from burning corn. He has not examined them carefully enough to determine. There is no mound at this point.

The explorations will be continued during the coming summer, and a further report was promised for the next meeting of the academy.

A New Aerobioscope.

A paper on 'A New Method for the Biological Examination of Air, with a Description of an Aerobioscope,' prepared by Professor W. T. Sedgwick of the Massachusetts Institute of Technology, describing experiments and inventions made by himself and one of his students, Mr. G. R. Tucker, was one of the popular features of Wednesday's session. Professor Sedgwick was introduced by Dr. J. S. Billings of the Army Medical Museum, who spoke briefly of the importance and difficulty, in cultivating bacteria from germs obtained from the air, of being certain that nothing was obtained except what is desired, and that what is wanted is secured.

Professor Sedgwick gave a brief history of the discovery of the existence of germs in the air, and of the advancement of scientific knowledge on that subject to the present time. He spoke of the cultivation of germs, and described the different kinds of apparatus in use for obtaining these germs. He then showed how, by a series of steps, he and Mr. Tucker have perfected an instrument for securing the germs, which he calls an 'aerobioscope,' and which is superior to any of those devised by European biologists. Without attempting a full description of this apparatus, it is enough to say that it consists of a glass tube six inches long and two or two and one-half inches in diameter. It is open at one end, and continued at the other at a greatly reduced size, not more than one-eighth of an inch in diameter. The tube is sterilized by heating, and four or five inches of sterilized granulated sugar is placed in the small part of the tube. Professor Sedgwick said that it had been denied that sugar could be sterilized, but he had accomplished it, raising the temperature as high as 120° C. without converting the sugar into caramel. Sterilized nutrient gelatine is then introduced into the tube, and forms a film upon the inner surface. A portion of the air the germs of which it is desired to examine is then drawn slowly through the tube from the larger end. The germs are arrested by the sugar; so that, when the ends of the tube are closed, they may be knocked down with the sugar into the larger part of the tube, and are developed on the gelatine. The sugar also becomes dissolved, and is a nutrient for the germs.

Professor Sedgwick showed why sugar was a better medium for holding back the germs than sand, glass wool, or any of the other substances that have been used. He also described an apparatus he has invented for introducing the germ-laden air into the tubes and at the same time accurately measuring it, and also the method of preserving the sterility of the stoppers. He exhibited a number of tubes prepared for experiment, and others in which germs were growing in various stages of development.

The Systematic Relation of Platypsyllus as determined by the Larva.

Professor C. V. Riley, in his paper on the above subject, drew attention to the unique character of *Platypsyllus castoris*, a parasite of the beaver, and gave an epitome of the literature on the subject, showing how the insect had puzzled systematists, and had been placed by high authority among the *Coleoptera* and the *Mallophaga*, and made the type even of a new order. He showed the value, as at once settling the question of its true position, of a knowledge of the adolescent stages. He had had, since November, 1886, some fourteen specimens of the larva obtained from a beaver near West Point, Neb., and had recently been led to study his material at the instance of Dr. George H. Horn of Philadelphia, who, at the last monthly meeting of the Entomological Society of Washington, announced the discovery of the larva by one of his correspondents the present spring, and who has a description of the larva in type. Professor Riley indicated the undoubted coleopterological characteristics of the insect in the imago state, laying stress on the large scutellum and five-jointed tarsi, which at once remove it from the *Mallophaga*, none of which possess these characters. He also showed that the larva fully corroborates its coleopterological position, while its general structure, and particularly the trophi and anal cerci and pseudopod, confirm its clavicorn affinities. He showed that the atrophied mandibles in the imago really existed as described by LeConte, and that even in the larva they were feeble, and of doubtful service in mastication. He mentioned as confirmatory of these conclusions the finding by one of his agents, Mr. A. Koebele, of *Leptinillus* (the coleopterological nature of which no one has doubted, and the nearest ally to *Platypsyllus*), associated with the latter upon beaver-skins from Alaska; also the parasitism of *Leptinus* upon mice. He paid a high compliment to the judgment and accuracy of the late Dr. LeConte, whose work on the imago deserves the highest praise, and whose conclusions were thus vindicated. "*Platypsyllus*, therefore," he concluded, "is a good coleopteron, and in all the characters in which it so strongly approaches the *Mallophaga* it offers merely an illustration of modification due to food-habit and environment. In this particular it is, however, of very great interest as one of the most striking illustrations we have of variation in similar lines through the influence of purely external or dynamical conditions, and where genetic connection and heredity play no part whatever. It is at the same time interesting because of its synthetic characteristics, being evidently an ancient type, from which we get a good idea of the connection in the past of some of the present well-defined orders of insects."

The Orbits of Aerolites.

Professor H. A. Newton, in discussing the orbits of aerolites, presented the results of the observation and study of a great number of meteors. Without following his line of argument, which was a very able one, his principal conclusion may be given, which is that the aerolites are moving in direct and not in retrograde orbits; that is, they move in the same general direction as the earth, and not in an opposite direction. The fact that the earth does not meet as many as it overtakes is one of his reasons for this conclusion. At the same time he admitted that there may be two reasons why fewer meteors met by the earth should be observed, besides their actual comparative number: first, they may move with such velocity that few reach the earth; and, second, they may fall when men are asleep or not abroad, that is, in the morning hours. The first of these points he did not discuss; but of the second he said, that of ninety-four observed aerolites that reached the earth, and whose zenith is known only at the instant they fall, more appeared in the afternoon than in the forenoon, seven-eighths of them in the daylight. Of the meteorites which we have in our cabinets, he said, and which have been seen to fall, by far the greater part have come from stones that were following the earth, and not moving in the opposite direction.

Spectrum Photography and the Spectrum of Carbon.

Professor H. A. Rowland of Johns Hopkins University presented two brief but very important papers on the spectrum. With new and greatly improved instruments invented and constructed at the university, he has succeeded in making a much more perfect map of the solar spectrum than his former one. The definition of the lines is far better than before, and in some cases single lines have been divided up. He also projected upon a screen, pictures of a number of the groups of lines in the spectrum of carbon, and announced his discovery of the wider distribution of carbon in the sun than has previously been demonstrated.

Vertebrate Fauna of the Puerco Series.

In his paper on the above subject, Professor E. D. Cope gave the position of this formation as below the lowest eocene beds, and above the upper cretaceous, and so of doubtful reference to one or the other of these great systems. The beds of Puerco occur in New Mexico; and Professor Cope said that he had described one hundred and six species from them, of which twelve are reptiles, one a bird, and ninety-three are mammalia. Besides a species of snapping-tortoise (*Chelydra crassa*, Cope), the reptiles presented nothing remarkable excepting three species of aquatic saurians of the genus *Champsosaurus*, Cope, which have their nearest relations in the period next older (Laramie). The greatest interest attaches to the mammalia. The species all belong to extinct families and suborders, except four possible lemurs; and the predominant orders of the first immediately following in time are absent. Eleven of the species are probably monotromes, or of the same order as the Australian duck-bill; forty-nine are flesh-eaters; and twenty-six are hoofed types. All the forms show themselves to be the ancestors of the later and modern mammals by indubitable characters of their structure.

AN ETHNOGRAPHICAL COLLECTION FROM ALASKA.

THE American Museum of Natural History in New York has received a magnificent ethnographical collection from Alaska, collected by Lieutenant Emmon, which forms a valuable supplement to the Powell collection from British Columbia, in the same museum. While the latter includes principally specimens of Haida and Tsimpshian origin, the new accession has been collected among the Tlingit, in whose territory Lieutenant Emmon spent more than five years. The new collection is now on exhibition in the museum, occupying about a fourth of the ethnological hall.

It is arranged in several groups, the first comprising a collection of fishing implements and weapons. The implements resemble in style those of the Haida and other tribes of the North-west coast. Of particular interest is a throwing-stick from Sitka, carved in the style peculiar to the Tlingit and Haida. The implement itself, however, is undoubtedly an imitation of the Eskimo throwing-board. The next group comprises a collection of weapons and armatures. We find among these, jackets made of heavy elk and sea-lion skins, which were impenetrable to the stone and copper weapons of ancient times. The Russian buttons on one of these show that it was used comparatively recently. Besides these, there is a series of remarkable armatures made of round sticks tied firmly together, and of thin pieces of wood arranged in a similar way. While the body was thus protected, heavy masks and hats, carved so as to present the crest of the warrior, fairly covered the head. They consisted of two or three parts made of heavy wood; and we can easily imagine how fierce a Tlingit warrior, incased in this armature, must have looked. The stone battle-axes, of which the collection contains quite a number, could hardly hurt men protected by this hat and coat.

In the same case in which these armatures are on exhibition, we see a collection of whistles used in dances. These do not properly belong to the Tlingit, who do not use whistles at their festivals, but are imported from the Queen Charlotte Islands, the country of the Haida, who have a great variety of these instruments. There is one flageolet in the collection, and several others are known which were collected among the Haida; but it is doubtful whether they are an original invention of these tribes, or an imitation of European instruments. It is very remarkable that the Tlingit should hardly use any whistles during their dances, while all tribes of British Columbia use them to a great extent. This is one of the few facts that are known, tending to prove that the culture of North-west America has been derived from various sources. It is to be regretted that the Powell collection does not contain whistles from the Kwakiutl, which would serve as a valuable object of comparison with those of the Haida, of which the museum possesses a great number.

Lieutenant Emmon has collected very valuable implements made of mountain-goat horn; but, what is more interesting, he shows us how these beautiful spoons and ladles are manufactured. The elegant curvature of the handle is produced by means of a strong piece of wood with two oblique perforations, a larger and a smaller one. The lower portion of the horn is pushed through the wider perforation, and the point turned back so that it can be pushed into the smaller hole. Thus it gets the curved shape required for the handle. The spoon itself is pressed between two pieces of wood, similar to a lemon-squeezer. By the side of the mountain-goat horn implements we observe beautifully carved paint-brushes, paint-pots made of stone, paints, baskets, and other household goods.

The most interesting part of the collection, however, is the large number of masks and dancing-implements, the greater part of which have been taken from graves. There are also very valuable and interesting rattles. It is remarkable that the collection contains only a few rattles in the shape of ravens, and these not elaborately carved, while the Powell collection contains many beautiful specimens of this class. This fact shows that they were probably not originally a Tlingit, but a Haida or Tsimpshian design. Besides this, Lieutenant Emmon states that they are only used in dances and festivals that have no religious character. In all shamanistic ceremonies other styles of rattles are used. Among the Tsimpshian, on the other hand, the raven rattle is the exclusive property of the Raven gens. Among the rattles of the Tlingit we observe many a beautiful carving, and it is worthy of remark that most of them represent certain myths or mythical beings. We observe the fabulous grandmother of men, of whom the Haida also tell, the Yēk (the genii of man), and the shaman tearing out the tongues of various animals in order to obtain the power of witchcraft.

Above these rattles, neck-rings made of red-cedar bark are exhibited. It appears, from a study of the Emmon and Powell collections, that these rings are not by any means so extensively used by the Haida and Tlingit as by the Kwakiutl, among whom they are closely connected with their religious ceremonies and dances. Indeed, it seems almost impossible to properly classify the neck-rings of the Haida and Tlingit, which seem to be used almost exclusively as ornaments. Among the Kwakiutl, the spirits of the dead, the cannibal, and other mythical figures, are each represented by a peculiar kind of ring, which is highly prized by its owner. When these rings are worn, the faces of the dancers are painted in a cer-